MATERIAL SAFETY DATA SHEET

1. SUBSTANCE AND SOURCE IDENTIFICATION

National Institute of Standards and Technology
Standard Reference Materials Program
100 Bureau Drive, Stop 2320
Gaithersburg, Maryland 20899-2320

SRM Number: 3128
MSDS Number: 3128
SRM Name: Lead Standard Solution

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Description: This Standard Reference Material (SRM) 3128 is intended for use as primary calibration standard for the quantitative determination of lead. One unit of SRM 3128 consists of five 10 mL sealed borosilicate glass ampoules of an acidified aqueous solution prepared gravimetrically to contain a known mass fraction of lead. The solution contains nitric acid at a volume fraction of approximately 10 %.

Substance: **Lead Standard Solution (Lead in 10 % Nitric Acid)**

Other Designations: **Lead** (plumbum) in **Nitric Acid** (aqua fortis; hydrogen nitrate; azotic acid; nitryl hydroxide); **Lead Nitrate**[(a)] (lead dinitrate; lead (II) nitrate; lead (II) dinitrate; plumbous nitrate)

[(a)] The addition of lead to nitric acid forms lead nitrate along with other intermediate chemical reactions.

2. COMPOSITION AND INFORMATION ON HAZARDOUS INGREDIENTS

Component	CAS Number	EC Number (EINECS)	Nominal Concentration (%)
Nitric acid	7697-37-2	231-714-2	10 (by volume)
Lead Nitrate	10099-74-8	233-245-9	1.6 (by mass)
Lead	7439-92-1	231-100-4	1 (by mass)

EC Classification (assigned):

Lead, Lead Nitrate
Xn, N

Nitric Acid Solution: 5% ≤ C < 20 %
C

Danger Hazard Symbol:

Lead Concentration Limits: 1% ≤ C < 5 %
T, N

Nitric Acid Solution: 5% ≤ C < 20 %
C

EC Risk:

Lead Concentration Limits: 1% ≤ C < 5 %
R20, R22, R33, R61

Nitric Acid Solution: 5% ≤ C < 20 %
R34

EC Safety:

Lead, Nitric Acid Solution
S1, S2, S23, S26, S36, S45, S53, S61

3. HAZARDS IDENTIFICATION

NFPA Ratings (Scale 0–4): Health = 3 Fire = 0 Reactivity = 0

Major Health Hazards: Respiratory tract, mucous membrane, skin, and eye burns. Suspect cancer hazard in animals. Birth defects.

Potential Health Effects

Inhalation: Corrosive. Effects should be less severe than from exposure to higher concentrations of nitric acid where exposure may cause respiratory irritation with coughing, choking, and burns of the mucous membranes.

Skin Contact: Corrosive. Effects should be less severe than from exposure to higher concentrations of nitric acid where exposure may cause pain and severe burns to the skin. Dilute solutions of nitric acid may cause mild irritation and harden the epidermis.

Eye Contact: Corrosive. Effects should be less severe than from exposure to higher concentrations of nitric acid where exposure may cause pain, lacrimation, photophobia, and severe burns to the eye.

Ingestion: **Nitric Acid:** Corrosive: Effects should be less severe than from exposure to higher concentrations of nitric acid where exposure may cause severe burns of the mucous membranes of the mouth, throat, and esophagus. Symptoms include immediate pain, difficulty or inability to swallow or speak, marked thirst, nausea, vomiting, and diarrhea.

Lead: The symptoms of lead poisoning may include abdominal pain, vomiting, diarrhea, and fatigue. Chronic exposure of lead is cumulative, and exposure even to small amounts can raise the body's content to toxic levels. Early stages of lead poisoning may cause anorexia, weight loss, constipation, fatigue, headache, weakness, metallic taste in the mouth, and anemia. Reproductive effects have been exhibited in both males and females. Lead crosses the placenta and may affect the fetus causing birth effects, mental retardation, and behavioral disorders.

Listed as a Carcinogen/ Potential Carcinogen:

Yes	No	
____	X	In the National Toxicology Program (NTP) Report on Carcinogens.
X	____	In the International Agency for Research on Cancer (IARC) Monographs.
____	X	By the Occupational Safety and Health Administration (OSHA).

4. FIRST AID MEASURES

Inhalation: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing by qualified personnel. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.

Skin Contact: Wash skin with soap and water for at least 15 minutes. Remove contaminated clothing and shoes. Get medical attention if necessary.

Eye Contact: Flush eyes, including under the eyelids, with copious amounts of water for at least 15 minutes. Get immediate medical attention.

Ingestion: If a large amount is swallowed, get immediate medical attention. Do NOT induce vomiting.

5. FIRE FIGHTING MEASURES

Fire and Explosion Hazards: Lead Standard Solution is a negligible fire hazard.

Extinguishing Media: Use water or any means suitable for extinguishing surrounding fire.

Fire Fighting: Move container from fire area if possible without exposure to risk. Avoid inhalation of material or combustion by-products. Wear full protective clothing and NIOSH-approved self-contained breathing apparatus (SCBA).

Flash Point: Not available.

Method Used: Not available.

Autoignition Temperature: Not available.

Flammability Limits in Air
Upper (Volume %): Not available.
Lower (Volume %): Not available.

6. ACCIDENTAL RELEASE MEASURES

Occupational Release: Do NOT touch material. Collect the material in an appropriate container for disposal. Subject to California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65). Keep out of sewer and water supplies.

Disposal: See Section 13, "Disposal Considerations".

7. HANDLING AND STORAGE

Storage: Store and handle in accordance with all current regulations and standards. Keep separated from incompatible substances.

Safe Handling Precautions: See Section 8, "Exposure Controls and Personal Protection".

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Exposure Limits:

Nitric Acid
OSHA: 5 mg/ m^3 (2 ppm) TWA
ACGIH (TLV): 2 ppm TWA
NIOSH: 5 mg/m^3 (2 ppm) recommended TWA (10 h)
WEL UK: 5.2 mg/m^3 (2 ppm) TWA

Lead, Inorganic Fumes and Dust (as Pb)
OSHA: 50 µg/m^3 TWA (8 h)
ACHIG (TLV): 0.05 mg/m^3 TWA
NIOSH: 0.100 mg/m^3 recommended TWA (10 h)

Ventilation: Use a local exhaust ventilation system. Ensure compliance with applicable exposure limits.

Eye Protection: Wear safety goggles. An eye wash station should be readily available near areas of use.

Personal Protections: Wear appropriate chemical resistant clothing and gloves to prevent skin exposure.

9. PHYSICAL AND CHEMICAL PROPERTIES

Component: **Lead Standard Solution**

Appearance and Odor: Liquid. Irritating odor.

Density: Not available.

Water Solubility: Soluble.

10. STABILITY AND REACTIVITY

Stability: X Stable ___ Unstable

Stable at normal temperatures and pressure.

Conditions to Avoid: Avoid contact with incompatible and combustible materials.

Incompatible Materials: Acids. Halogens. Combustible materials. Oxidizing materials. Metals. Bases. Metal Salts. Metal Oxides. Metal carbides. Peroxides.

Fire/Explosion Information: See Section 5, "Fire Fighting Measures".

Hazardous Decomposition: Thermal decomposition may produce lead, oxides of lead, and oxides of nitrogen.

Hazardous Polymerization: ___ Will Occur X Will Not Occur

11. TOXICOLOGICAL INFORMATION

Route of Entry: X Inhalation X Skin X Ingestion

Toxicity Data:

Nitric Acid
Human, Oral LD_{LO}: 430 mg/ kg
Rat, Inhalation LC_{50}: 260 mg/m^3 (30 min)
Rat, Skin TD_{LO}: 150 ml/kg

Lead
Woman, Oral TD_{LO}: 450 mg/kg (6 years)
Human, Oral LD_{LO}: 155 mg/kg
Human, Inhalation TC_{LO}: 10 μg/m^3
Rat, Intraperitoneal LD_{LO}: 1 g/kg

Lead Nitrate
Rat, Intraperitoneal TD_{LO}: 270 mg/kg

Carcinogenic, Tumorigenic, Mutagenic Data:

Nitric Acid has been investigated as a reproductive effector.

Lead is recognized by IARC as Group 2B carcinogen status (lead and inorganic lead compounds), Human Inadequate Evidence and Animal Sufficient Evidence; Recognized by ACGIH as A3 carcinogen status (lead and inorganic lead compounds), Animal Carcinogen. Lead has also been investigated as a mutagenic and reproductive effector.

Medical Conditions Aggravated by Exposure:

Nitric Acid: Eye, respiratory, and skin disorders. Allergies.
Lead and Lead Nitrate: Blood system disorders. Gastrointestinal disorders. Nervous system disorders. Respiratory disorders.

Health Effects (Acute and Chronic): See Section 3, "Hazards Identification".

12. ECOLOGICAL INFORMATION

Ecotoxicity: Lead and lead nitrate are toxic to aquatic life.

13. DISPOSAL CONSIDERATIONS

Waste Disposal: Dispose in accordance with federal, state, and local regulations. Dispose of in accordance with U.S. EPA 40 CFR 262, Hazardous Waste Number D008 for concentrations at or above the Regulatory Level for lead (5.0 mg/L).

14. TRANSPORTATION INFORMATION

U.S. DOT & IATA: Nitric acid, solution; Hazard Class 8, UN2031; Packing Group II; Excepted quantity (10 mL × 5 ampoules).

15. REGULATORY INFORMATION

U.S. Regulations: CERCLA Sections 102a/103 (40 CFR 302.4): Lead Nitrate, Lead: 10 lbs RQ. Nitric Acid: 1000 lbs RQ.

SARA Title III Section 302 (40 CFR 355.30): Nitric Acid: 1000 lbs TPQ. Lead not regulated.

SARA Title III Section 304 (40 CFR 355.40): Nitric Acid: 1000 lbs RQ. Lead not regulated.

SARA Title III, Section 313 (40 CFR 372.65): Lead. Lead compounds. Nitric Acid

OSHA Process Safety (29 CFR 1910.119): Lead not regulated. Nitric Acid: 500 lbs TQ (≥ 94.5 % by weight).

California Proposition 65: Lead and lead compounds are known to the state of California to cause cancer (1992) and cause male and female reproductive toxicity (1987). Nitric acid not regulated.

SARA Title III Sections 311/312 Hazardous Categories (40 CFR 370.21):

ACUTE:	Yes.
CHRONIC:	Yes.
FIRE:	No.
REACTIVE:	No.
SUDDEN RELEASE:	No.

CANADIAN Regulations: WHMIS Classification: Not determined.

National Inventory Status: U.S. Inventory (TSCA): Lead, Lead Nitrate, and Nitric Acid are listed on inventory.

TSCA 12b Export Notification: Not listed.

EC Classification:

Lead

Xn	Harmful.
N	Dangerous for the Environment.

Nitric Acid Solution: 5% ≤ C < 20 %

C	Corrosive

Danger/Hazard Symbol:

Lead

T	Toxic
N	Dangerous for the Environment

Nitric Acid Solution: 5% ≤ C < 20 %

C	Corrosive

EC Risk and Safety Phrases:

Lead with Concentration Limits: 1% ≤ C < 5 %

R20/22	Harmful by inhalation and if swallowed.
R33	Danger of cumulative effects.
R61	May cause harm to unborn child.
S45	In case of accident or if you feel unwell, seek medical advice immediately.
S53	Avoid exposure; obtain special instructions before use.
S61	Avoid release to the environment.

EC Risk and Safety Phrases: **Nitric Acid Solution: 5% ≤ C < 20 %**

R34	Causes burns.
S1/2	Keep locked-up and out of the reach of children.
S23	Do NOT breathe gas, fumes, vapor, or spray.
S26	In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S36	Wear suitable protective clothing.
S45	In case of accident or if you feel unwell, seek medical advice immediately.

16. OTHER INFORMATION

Sources: MDL Information Systems, Inc., MSDS *Lead* 16 June 2005.
MDL Information Systems, Inc. MSDS *Lead Nitrate* 16 June 2005.
MDL Information Systems, Inc. MSDS *Nitric Acid Solutions* 16 June 2005.

Disclaimer: Physical and chemical data contained in this MSDS are provided only for use as a guide in assessing the hazardous nature of the material. The MSDS was prepared carefully, using current references; however, NIST does not certify the data in the MSDS. The certified values for this material are given in the NIST Certificate of Analysis.